



# **CHEMICAL ENGINEERING**

## **Chemical Technology**

*Hand Notes For GATE, IES, PSUs & Competitive Exam*

### **Hand Notes**

**Page Length : 57**

**Note :** We also providing GATE, IES, PSUs & Competitive Exam Materials [Handnotes, Shortnotes & Books], All Reports [Seminar Reports & PPT]

**Goto : [www.martcost.com](http://www.martcost.com)**

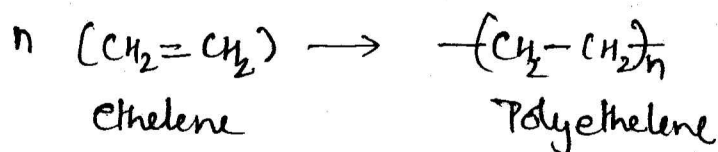
Sep 17/14

Chemical Technology

Polymer	Petroleum	Petrochemical	Natural Pdt
<ul style="list-style-type: none"> <li>⇒ Thermoplastic</li> <li>⇒ Thermosetting</li> <li>⇒ Elastomer</li> <li>⇒ Fiber</li> </ul>	<ul style="list-style-type: none"> <li>⇒ Characteristic</li> <li>⇒ Classification</li> <li>⇒ Properties</li> </ul> <p>↓ Crude oil</p>	<p><u>Products of</u></p> <ul style="list-style-type: none"> <li>⇒ Ethylene</li> <li>⇒ Propylene</li> <li>⇒ Butylene</li> <li>⇒ Benzene</li> <li>⇒ Toluene</li> </ul>	<ul style="list-style-type: none"> <li>⇒ Sulfuric Acid</li> <li>⇒ Paper &amp; pulp</li> <li>⇒ Soap &amp; Detergent</li> <li>⇒ Sugar</li> <li>⇒ Oil &amp; Fats</li> <li>⇒ Chlor-Alkali</li> <li>⇒ Fertilizers</li> </ul>

Polymer :-

Polymers are large chain molecules having a high molecular wt., these are made up a single unit or a molecule which is repeated several tym within the chain structure. This repeating unit is known as the monomer. & the process is known as polymerization.

Types of Polymerization :-Addition Polymerization :-

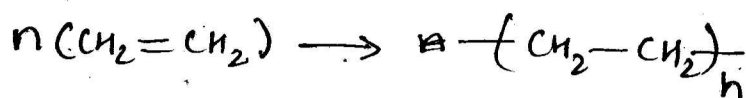
The rxn occur by the formation of rapid change and no elimination of small molecule takes place.

Such rxn generally occur among double & triple bonded molecules. Type

## Types of addition polymerization

### Step Rxn:-

A  $\pi$  bond is broken and two new  $\sigma$  bonds are formed.



### Chain Rxn:-

In the chain rxn, we need four things | free radical

- Initiation
- Propagation
- Termination.

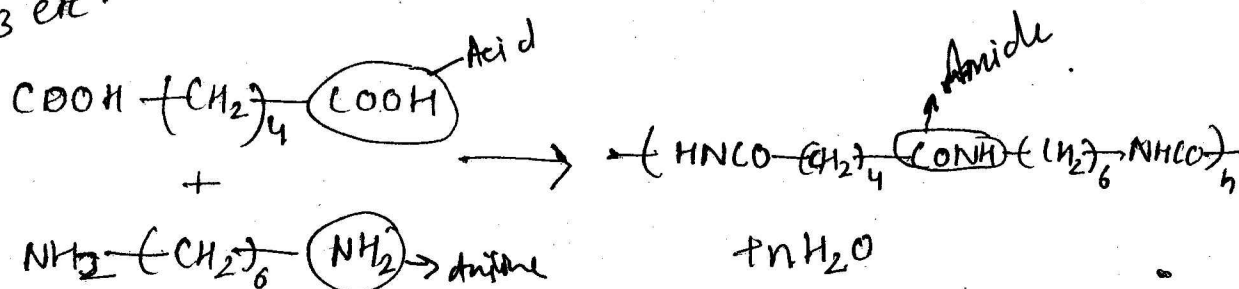
Polymer is formed in a single step within the fraction of second. The chain kinetics occur in three steps above mentioned. The chain transfer agent may be used if necessary.

### ionic Rxn:-

These are similar to the chain addition rxn w/ +ve & -ve charges.

## Condensation Polymerization

Two or more than 2 monomeric units combine together to form a new compound having different functional group with the elimination of small molecules like water, hydrogen,  $\text{NH}_3$  etc.



## Techniques of Addition Polymerization

### Bulk Polymerization:-

- Bulk Polymerization consists of a reactor, monomer units, initiator, a chain transfer agent if necessary and a terminator.
- This mode of polymerization may be employed to obtain the purest form of polymer.
- Pure liquid or gaseous monomer is subjected to the polymerization condition.
- The rxn is exothermic & heat removal is the main concern. Therefore heat control system is required.
- Polystyrene and many other thermoplastic compounds are made by using this technique.

### Solution Polymerization:-

- An inert solvent is added to the reacting mixture in the rxn vessel in the process. The solvent enhances the heat capacity and therefore facilitates heat transfer.
- Some of the solvent may be refluxed to remove heat from the rxn vessel.
- Compared to the bulk polymerization, solution polymerization reduces both the rxn rate and the molecular wt. of the compound.

Suspensi-

### Suspension/ Emulsion Polymerization:-

- In order to control an enormous amt of heat release in bulk polymerization, in suspension polymerization, rxn. mass is dispersed or suspended as minute droplets of size 1mm in dia.